AMENDMENTS TO THE DRAWINGS

The attached sheets of drawings include changes to Figures 2 and 3. These sheets replace the original sheets. In Figure 2, the number "15" has been replaced with the number "16". Also in Figure 2, the number "16" has been replaced with the number "17". The number "17" has been deleted where indicated. In Figure 3, the number "35" has been replaced with the number "36". Also in Figure 3, the number "36" has been replaced with the number "35". An explanation for the reversal of numbers in Figures 2 and 3 are described in the Remarks.

Attachment: Replacement Sheets

REMARKS

Claims 1 to 14 and 16 to 19 are pending. Claim 15 has been cancelled since the limitation is incorporated into Claim 1. No claims are allowed.

The drawings were objected to as failing to comply with 37 CFR 1.184(p)(5). Enclosed are the Replacement Sheets for Figures 2 and 3.

Claim 15 regarding washing of the fermented uncooked food has been incorporated into Claim 1.

In reference to the Examiner's note and the rejections under 35 USC 112, first paragraph, the arrows in Figures 2 and 3 clearly show the direction of fluid flow from the reactor. The numbers were reversed on the drawings. Enclosed are proposed revised drawings. Page 8 is correct with the numbers reversed in Figure 3. The tank is drained of the aqueous medium as set forth in Example 1 through the strainer (11) as disclosed. Applicant does have support for Claims 1 to 8 and 10 to 19 as can be seen from Example 1. Further, the food is removed from the fermenter for cooking such as "baking" or "frying" as in Figure 1. Reconsideration of this rejection under 35 USC 112, first paragraph, is requested.

Claims 1 to 8 and 10 to 19 were rejected under 35 USC 112, second paragraph, as being indefinite. Claim 1 in part (a) recites "an uncooked processed food". There is no "aid"

in the claim. Claim 14 now recites the fact that the pH of the medium is adjusted prior to "and" during the fermentation. The pH is adjusted for the microorganisms. Reconsideration is requested.

Claims 1-5, 7-12, 14-16 and 18 are rejected under 35 USC 103(a) as being unpatentable over Lynn (U.S. Patent No. 5,221,617). Lynn uses a precursor base to improve the functional and sensory properties of the bakery end products through fast fermentation. The precursor base, which is a fermentation aid, consists of sugar, yeast, acidic concentrate, flour, lactic bacteria and non-fat dry milk. The yeast is inactive dry yeast (Column 11, Lines 18, 19 and Claim 18). Lynn teaches that it is essential for sugars to be present in the uncooked bakery dough, through the precursor base, to contribute to the general flavor development and achieve a proper carmelization (browning reaction) of the bakery end-product (Column 11, Lines 6-13). In contrast, the Applicant teaches the opposite, which is the removal of sugars from the fermented uncooked product (mono- and di-saccharides <0.1%, Table 2, 3, 4, 5, 6, 7, 8 and 9) using a different fermentation medium to avoid the formation of acrylamide during cooking. Acrylamide formation involves the reaction of sugar (mono-, di- and oligosaccharides) with free asparagine following Maillard-type reactions. Sugars (mono-, di- and oligosaccharides) and

asparagine are acrylamide precursors. By the addition of sugars as well as skim-milk powder (naturally rich in mono- and disaccharides), as taught by Lynn, to the starch based material (flour), the acrylamide content can be increased significantly in the bakery end product. Therefore, the fermentation aid (precursor base) used by Lynn promotes the formation of acrylamide in the bakery end-products.

The Applicant used 0.5% Dry Yeast Extract (Figures 1, 4, 5 and 6) as a fermentation ingredient, before the onset of the fermentation to support the initial growth and activities of the fermenting microorganisms. The Dry Yeast Extract, which is the water soluble component of the yeast cell, is mainly protein and lacks the acrylamide precursor asparagine, and contributes only a small amount of carbohydrate (0.03 to 0.06%, an average of 0.04%) to the fermentation medium at the 0.5% usage level reported by the Applicant. That small amount of carbohydrate (0.04%) consists of starch, fiber, and sugars; therefore, the amount of sugars coming from the Dry Yeast Extract (0.5%) is even way less than 0.04%. Moreover, after being subjected to the fermenting microorganisms as described in Figures 1, 4, 5 and 6, that very minute amount of sugars from the Dry Yeast Extract was even reduced more. Since asparagine is naturally not present in the Dry Yeast Extract, and the amount of mono- and di-saccharides is very minute

(<<0.04%); therefore, the addition of Dry Yeast Extract, as a fermentation ingredient, does not promote the formation of acrylamide. Unlike the Applicant's fermentation ingredient, Lynn's precursor base (fermentation aid) promotes the formation of acrylamide. Therefore, Lynn's precursor base is not capable of performing the intended use of the claimed invention.

The mechanics of Lynn's invention and the Applicant's are completely different. Lynn's process requires multiple steps and multiple incubations (Column 5, Lines 35-68 and Column 6, Lines 1-36). The Applicant's process requires just one step and one incubation (Example 1 and Figure1), which results in significant energy and labor savings.

Lynn's fermentation apparatus as described in Figures 1 and 2 requires: (a) a precursor ingrediator 20 to prepare precursor slurry; (b) a fermenter system 40 for preparing a preferment mixture; (c) heat exchanger 60 and (d) holding tank 70. The Applicant's fermentation apparatus, described in Figures 2 and 3, consists of a simple mixing tank equipped with a mixer or a pump. In the preferred claimed invention, the fermentation medium, including the fermenting microorganisms, is circulated in and out of the reactor in a loop form using a pump while the substrate (fresh potato slices) remain stationary in the reactor (Figures 1 and 2). After the completion of the fermentation, the fresh fermented potato

slices are washed with water before cooking to remove any residual leftover from the fermentation medium including the fermenting microorganisms that can negatively affect the flavor. Unlike the Applicant, Lynn does not teach washing the fermented product before cooking, and the mechanics of his process cannot allow a washing step to take place anyway.

There are several differences between U.S. Patent No. 4,568,643 to Levy and the Applicant:

The two (2) inventions are not related and have different scopes. The fermenting microorganisms, the materials being treated, process mechanics and products are completely different and require different treatments and apparatus. Levy describes a continuous fermentation process for the production of butanol using cooked mashed carbohydrate materials to convert the starch to a form that is easily acted upon by the bacteria (Column 13, Lines 3 to 14). The entire carbohydrate materials (starch, mono-, di and oligosaccharides) are used as a substrate to produce butanol. The fermentation process is not selective for a specific carbohydrate in the cooked carbohydrate-containing materials. Levy does not teach cooking the already cooked substrate after being fermented, because the majority, if not all, of the substrate was converted to butanol. In contrast, the Applicant teaches a fermentation batch process for selectively removing the acrylamide

precursors (mono- and di-saccharides) from uncooked starchy foods, e.g., potato slices, leaving the starch and other ingredients intact. Moreover, the Applicant teaches cooking the uncooked, fermented, and mono- and di- saccharides depleted starchy food to produce acrylamide reduced end products, e.g., potato chips, breakfast cereal etc.

Levy teaches that the product is harvested in a separate unit independent of the fermentation reactor, using a fluorocarbon solvent, so that the culture medium will not be inactivated (Column 2, Lines 15-19; Column 4, Lines 55-68). The Applicant's product and substrate are both harvested in the fermentation reactor (Figures 2 and 3). Moreover, the Applicant's products and substrate are both used to produce the acrylamide reduced final end product (Figures 3, 4, 5 and 6).

> The Examiner stated on page 6 of the Office Action that: "Levy further teaches a porous wall (Column 3, lines 53-57) that would prevent the product to be fermented, such as a potato, from exiting through the outlet."

In fact, this is not what Levy taught. Levy teaches that the product to be fermented (substrate), butanol, excess sugars and other solvents leave the fermentation reactor to the extraction unit back to the feeding tank after the butanol is being extracted with extraction solvent 47 (Column 4, Lines 55-62). The substrate is exiting the fermentation medium through the membranes and porous surfaces (Column 3, Lines 2-4; Column

11, Lines 27-34 and Lines 43-48) and just the bacteria are retained in the space between pipe 18 and membrane wall 22 (Column 4, Lines 40-43). In contrast, the Applicant teaches that the substrate is retained and the fermenting microorganisms are exiting through an outlet (strainer). Levy's reactor is not capable of performing the intended use of the claimed invention. There is no reasonable chance of success.

Claims 1-6, 8, 10, 13, 15 and 17-19, are rejected under U.S.C. 103(a) as being unpatentable over Hilton et al. (U.S. Patent No. 4,140,801) in view of Levy (U.S. Patent No. 4,568,643). Levy has been discussed above.

There are several differences between Hilton's invention and the Applicant's invention. In the Office Action on page 9 (Lines 1-3), the Examiner said:

> "Hilton et al. further teaches subdividing the potato pieces to a sufficient extent so as to effectively mix the yeast with the solids, so as to progress fermentation at a "satisfactory rate" (Column 2, Lines 37-47)."

In addition to what the Examiner reported, Hilton et al. also teaches to bleach the potato solids, when starting with raw potatoes, with hot water or steam for a time sufficient to gelatinize a substantial portion of the starch in the solids (Column 2, Lines 57-65). In Example I, Hilton et al. teaches "The slices were blanched by contact with steam

in a chamber maintained at atmospheric pressure for 20 minutes. The blanched potato slices were water-washed to remove excess free starch from the surfaces of the slices, and they were then mashed in a Hobart meat grinder having a grinding plate with orifices 3/16 inch in diameter."

The starting material used by Hilton et al. in all the Examples (Example I to V) was blanched mashed potatoes, which was subsequently fermented with baker's yeast and dried to 48% solids content. There is no separation of the Baker's yeast after the fermentation is completed and, therefore, the yeast ends up in the final end product. The yeast has detrimental effect on the flavor of the end product. In contrast, the Applicant preferably used very thin slices of fresh potatoes, which were subsequently fermented with either baker's yeast or lactic acid bacteria. The fermentation medium, including the fermenting microorganisms, was circulated in and out of the reactor in a loop form using a pump until the fermentation was completed. After the completion of the fermentation, the fermented fresh potato slices were washed with water before frying to remove any residues from the fermentation medium left on the slices. Unlike Hilton et al., the fermenting microorganisms, whether lactic acid bacteria or Baker's yeast, are not present in the final product, they were washed off after the fermentation was completed. The two (2)

inventions are not related and have completely different scopes. The fermenting microorganisms, the materials being treated, process mechanics and products are completely different and require different treatments and apparatus. Again, unlike what the Examiner states, the substrate in Levy's invention was circulated and the culture was stationary in the reactor. This is the opposite of what the claimed invention is teaching where the substrate is stationary and the fermenting medium, including the culture, is circulated in and out of the reactor in a loop form using a pump.

Hilton teaches "Among the materials which may be added to the mixture to be formed, are, for example, starch containing ingredients such as rice, tapioca, potato or wheat flour or starches, antioxidants or other additives, and the solids are composed to major extent of potato solids (Column 6, Lines 7-12). The addition of the materials suggested by Hilton took place after the fermentation was accomplished. These materials were not subjected to the fermentation process, and since these materials are rich in acrylamide precursors, the amino acid asparagine and sugars, therefore, lead to increased formation of acrylamide in the end product during cooking. In contrast, the Applicant added 0.5% Dry Yeast Extract (a fermentation aid) that is free of the amino acid asparagine and has a negligible amount of sugars (<<0.04%,

before the onset of the fermentation to support the initial growth and activities of the fermenting microorganisms. The Examiner in the prior Office Action mailed June 14, 2006, stated:

> "The addition of the second source of potato (Column 2, Lines 60-63) or the other starch-containing materials (Column 6, Lines 7-12, inherently provides both a source of added sugar and amino acids, thus meeting instant Claims 2-3."

The Applicant used the entire fermented product, without addition of any unfermented materials after the fermentation was accomplished, to keep the acrylamide precursor levels low so that the acrylamide formation in the end products will be significantly reduced during cooking. The process described by Hilton is not capable of performing the intended use of the claimed invention because it promotes the formation of acrylamide.

There are several differences between U.S. Patent No. 4,293,655 to Christ et al. and the Applicant:

In his letter on page 7, the Examiner said:

> "Christ et al. (US 4,293,655) Column 7, Line 51 to Column 8, Line 5" as further evidence that it was known in the art to provide a fermentation process comprising recirculation of a fermentation and a sieves (Figure 1, item 11) to filter the exiting medium."

In fact, there is no column 7 or column 8 in the U.S. Patent No. 4,293,655, it just consists of 6 columns. The

Examiner has miscited the reference. Moreover, the Examiner mistakenly referred to item 11 in Figure 1 as "a sieves." In fact, Christ et al. teaches that item 11 in Figure 1 is not "a sieves", it's a valve or spigot. "A valve or spigot 11 is provided for controlling the rate at which the liquid is removed" (Column 3, Lines 33-35).

The two (2) inventions are not related and have different scopes. The fermenting microorganisms, the materials being treated, process mechanics and products are completely different and require different treatments and apparatus. For example, in the claimed invention, the Applicant did not recirculate the fermentation medium as described in Figures 3, 4, 5 and 6, there was no need to do so. He just used a regular mixer equipped with a shaft and an impeller, because the shaft and the impeller in this case do not physically damage the starchy materials inside the reactor during mixing. On the other hand, when fresh potato slices were treated (Figures 1 and 2), the Applicant could not use a mixer equipped with a shaft and an impeller, because during mixing, the impeller and the shaft break and damage the potato slices and the final end product after cooking (potato chips) will not be appealing. The Applicant used in this case a fermentation reactor equipped with a strainer at the bottom exit of the reactor and a pump to circulate the aqueous fermentation medium in and out of the

reactor in a loop form, without a liquid distribution device on top, to agitate the fermentation medium and the potato slices inside the reactor to prevent the potato slices from clumping together so that all the sliced sides are exposed to the fermenting agent. In contrast, Christ et al. described a process and an apparatus for ensilaging and fermenting animal and vegetable materials, which comprises recycling liquid removed from the bottom of the ensilage container, recycling it and redistributing it on top of the materials being ensilaged using a distribution device on top of the reactor (Column 1, Line 63 to Column 2 Line 4; Column 2, Lines 14-20). Unlike the Applicant, the Christ et al. distribution device may be used without the recycle means illustrated (Column 4, Lines 35-35). The reactor described by Christ et al. is not capable of performing the intended use of the claimed invention. There is no reasonable chance of success for the following reasons: (a) The distribution device (inlet for the recycled liquid to be redistributed evenly to rehydrate the ensilaged materials) used by Christ et al. and placed on top of the reactor slows down the velocity of the liquid into the reactor and, therefore, no agitation of the potato slices in the fermentation medium, which leads the potato slices to clump together and precipitate at the bottom of the reactor. Once clumped together, the potato slices cannot be exposed to the

fermenting microorganisms and, therefore, the acrylamide precursors in the potato slices remain intact; (b) the distribution device, placed on top of the reactor, cannot be used by the Applicant because it will be clogged by the potato slices. The potato slices cannot go through the pores of the distribution device; (c) the potato slices will back up the circulating pumps that enable the circulation of the fermentation medium, because there is no strainer at the exit bottom of the Christ et al. reactor.

Christ et al. describes a separate heat exchange device (Column 2, Lines 5-13; Column 4 Lines 39-51; Figure 3) to heat the recycled juice. The Applicant heats, through direct steam injection in the reactor, the entire fermentation medium not just the juice, and the cooling is with cold water through the stainless jacket around the mixing tank (Figures 2 and 3).

There are several differences between U.S. Patent No. 4,238,567 to Staron and the Applicant:

The Examiner states:

> "Staron (U.S. 4,238,567) provide further evidence that it was known in the art to provide recirculation of a fermentation liquor for the purpose of providing a moist and consistent fermentation process and product (Column 1, Lines 22-62)."

In fact, lines 22 to 62 in U.S. Patent No 4,238,567 cited by the Examiner, are completely irrelevant to what the Examiner is referring to and do not remotely describe or suggest to recirculate a fermentation liquor.

The two (2) inventions are not related and have completely different scopes. The fermenting microorganisms, the materials being treated, process mechanics and products are completely different and require different treatments and apparatus. The fermentation device of the apparatus according to Staron (Column 7, Lines 1 to 23; Figures 2 and 3) includes "perforated trays 4 connected together by the support 5 and uprights 6. The support 5 is connected to an excentric system 7 driven by a motor 21 which permits the group of trays to be moved by actuating them with an up and down motion. The excentric system and the group of perforated trays constitute a sort of stirrer which permits the mycelium to rise above the liquid level. The apparatus described by Staron is not capable of performing the intended use of the claimed invention. The stirring system used by the Applicant is completely different than Staron's and is not even remotely related. There is no reasonable chance of success to use Staron's apparatus in the claimed invention, because it physically damages the potato slices. The Applicant used a circulating pump to stir the fermentation medium. The circulating liquid, in and out of the

reactor in a loop form, is stirring the fermentation medium rather than perforated trays and shafts (as suggested by Staron) that physically damage the potato slices in our case and yield, after cooking, unappealing end products (potato chips). Otherwise, the Applicant could have used the reactor that he described in Figure 3.

Staron is circulating the liquid to aerate the culture medium. The Applicant is circulating the medium (Figure 2) in and out of the reactor to stir the fermentation medium without using impellers, shafts, and perforated trays that physically damage the potato slices. There is no need for aeration in the Applicant's case.

Claims 1-5, 7-8, 11-12, 14 and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hollenbeck (U.S. Patent No. 3,615,697) in view of Levy (U.S. Patent No. 4,568,643). Levy has been discussed. There are several differences between Hollenbeck and the Applicant. The two (2) inventions are not related and have completely different scopes. The fermenting microorganisms, the materials being treated, process mechanics and products are completely different and require different treatments and apparatus. Hollenbeck uses fermented malt flour, a powdered additive, to improve the functional and sensory properties of the bakery end products. By the addition of malt flour as well as cheese whey

(naturally rich in mono- and disaccharides), as taught by Hollenbeck, to the starch based material (flour), the acrylamide content can be increased significantly in the bakery end product. In contrast, the Applicant teaches the opposite, which is the removal of sugars from the fermented uncooked product (mono- and di-saccharides <0.1%, Table 2, 3, 4, 5, 6, 7, 8 and 9) using a selective fermentation aid to avoid the formation of acrylamide during cooking. Acrylamide formation involves the reaction of sugar (mono-, di- and oligosaccharides) with free asparagine following Maillard-type reactions. Sugars (mono-, di and oligosaccharides) and asparagine are acrylamide precursors. Therefore, the powdered additive used by Hollenbeck promotes the formation of acrylamide in the bakery end-products. The Applicant used 0.5% Dry Yeast Extract (Figures 1, 4, 5 and 6) as a fermentation aid, before the onset of the fermentation to support the initial growth and activities of the fermenting microorganisms. The Dry Yeast Extract, which is the water soluble component of the yeast cell, is mainly protein and lacks the acrylamide precursor asparagine, and contributes only a small amount of carbohydrate (0.03 to 0.06%, an average of 0.04%) to the fermentation medium at the 0.5% usage level reported by the Applicant. That small amount of carbohydrate (0.04%) consists of starch, fiber, and sugars; therefore, the amount of sugars

coming from the Dry Yeast Extract is even way less than 0.04%. Moreover, after being subjected to the fermenting microorganisms as described in Figures 1, 4, 5 and 6, that very minute amount of sugars from the Dry Yeast Extract was even reduced more. Since asparagines is naturally not present in the Dry Yeast Extract, and the amount of mono- and di-saccharides is very minute (<<0.04%); therefore, the addition of Dry Yeast Extract, as a fermentation aid, does not promote the formation of acrylamide. Unlike the Applicant's fermentation aid, Hollenbeck's powdered additive promotes the formation of acrylamide. Therefore, Hollenbeck's powdered additive is not capable of performing the intended use of the claimed invention.

The mechanics of Hollenbeck's invention and the Applicant's are completely different. The Applicant's invention, as described in Figures 1 and 2, circulates the fermentation medium, including the fermenting microorganisms, in and out of the reactor in a loop form using a pump while the substrate (fresh potato slices) remain stationary in the reactor. After the completion of the fermentation, the fresh fermented potato slices are washed with water before cooking to remove any residual leftover from the fermentation medium including the fermenting microorganisms. Unlike the Applicant, Hollenbeck does not teach washing the fermented product before

cooking, and the mechanics of his process cannot allow a washing step to take place anyway.

Again, unlike what the Examiner is saying, the substrate in Levy's invention was circulated and the culture was stationary in the reactor. This is the opposite of what the claimed invention is teaching where the substrate is stationary and the fermenting medium, including the culture, is circulated in and out of the reactor in a loop form using a pump.

It is now believed that Claims 1 to 14 and 16 to 19 are in condition for allowance. Notice of Allowance is requested.

Respectfully,

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Enclosure: Replacement Figures 2 and 3